

Appl. No. : 09/787,062  
Filed : June 28, 2001

### REMARKS

Claims 1-39 are pending and remain rejected as unpatentable over DiMeo (U.S. Patent No. 5,972,430) in view of Kirlin (U.S. Patent No. 5,453,494) and/or Maita (U.S. Patent No. 6,020,024).

#### No Motivation

Applicants submit that the Examiner has not shown motivation to employ the recited precursor in a manner that meets Applicants' recitations of "ALE," "saturating surface reactions" or "self-limiting." Rather each of the three asserted references is a *CVD* reference. Thus, Applicants assert that the Examiner has failed to provide references that teach each and every element of Applicants' claims. As a result, the Examiner has not shown a *prima facie* case of obviousness.

Applicants recite, in every claim, an "Atomic Layer Epitaxy (ALE)" process including "saturating surface reactions" (or "saturating...surface reactions") using a cyclopentadienyl precursor or compound. In addition, every claim recites that the ALE process is "self-limiting." In comparison, the Examiner has failed to provide *any* reference teaching or suggesting an ALE process employing saturating surface reactions with a cyclopentadienyl precursor or compound. In place of such a reference, the Examiner has maintained that DiMeo's pulse-limited CVD process is "an equivalent variant" of ALE. In response, Applicants have explained that an ALE process, as understood by the skilled artisan, is inherently a process which employs self-limiting, saturating surface reactions. Furthermore, Applicants have pointed out that a purge-limited process is not *self*-limiting. In prior responses, Applicants have also amended all pending claims to recite "self-limiting" and "saturating surface reactions" in order to speed prosecution, even though the skilled artisan would understand these qualities to be inherent to an ALE process.

Furthermore, in the two most recent responses, Applicants also submitted three references (Bedair, M. Vehkamäki et al., and M. Nakano et al.) as evidence of the skilled artisan's understanding of an ALE process. In the most recent Action, the Examiner has refused to consider these references because they were not made of record. However, these references were not submitted as prior art references, but rather to inform the Examiner as to the ordinary and customary meaning of Applicants' claim language to the skilled artisan. Accordingly, Applicants are not required to submit these references on a PTO form 1449. However, in order

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to address the Examiner's concerns, Applicants have included a 1449 form herewith citing these references. Applicants respectfully request that the Examiner consider these references in view of the following remarks and caselaw.

The Federal Circuit has mandated that, "[i]n construing a claim, claim terms are given their *ordinary and accustomed meaning* unless examination of the specification, prosecution history, and other claims indicates that the inventor intended otherwise." *Nike Inc. v. Wolverine World Wide, Inc.*, 33 U.S.P.Q. 2d 1038, 1039 (1994) (*emphasis added*). In addition, "although the PTO must give claims their broadest *reasonable interpretation*, this interpretation *must be consistent with the one that those skilled in the art would reach*." *In re Cortright*, 49 U.S.P.Q. 2d 1458, 1467 (Fed. Cir. 1999) (*emphasis added*). See also *In re Morris*, 44 U.S.P.Q. 2d 1023, 1027 (Fed. Cir. 1997). Furthermore, the M.P.E.P. clearly states that "the words of a claim...must be read as they would be interpreted by those of ordinary skill in the art." §2111.01.

It follows from the above, that the Examiner must consider the "ordinary and accustomed meaning" unless Applicants have indicated an intention to deviate from this meaning. In the present case, Applicants have not indicated any intention to deviate from the ordinary and accustomed meaning of the terms "Atomic Layer Epitaxy (ALE)," "self-limiting," and "saturating surface reactions;" on the contrary, Applicants have repeatedly emphasized the ordinary and accustomed meaning of the terms at issue. As a result, these recited terms must be given "their broadest reasonable interpretation....consistent with the one that the those skilled in the art would reach."

Rather than considering the ordinary and accustomed meaning of Applicants' claim language, the Examiner continues to maintain that the cited references, in combination, teach a self-limited ALE process based on his conclusion that the "combination of references...discloses *purging* between growth steps in an atomic layer CVD deposition process indicating to the ordinary skill artisan a limited process." Office Action at p. 6 (*emphasis added*). Furthermore, the Examiner states the following:

"The examiner is not persuaded by the argument that the ALE process is self limited while that of DiMeo is not. The applicant ignores the purging of excess precursor in DiMeo et al. One of ordinary skill would conclude that *this purging limits the precursor available* in the deposition chamber for the oxidation reaction."

Office Action at p. 8 (*emphasis added*).

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However, the Examiner's logic above only supports the conclusion that DiMeco's process is *limited* (not self-limited) through *external control*, i.e. a computer controlling reactive pulse length and inert purge timing to control deposition. This logic fails to explain how the reactions of DiMeco are *self-limiting*. The reactions themselves in a CVD reaction do not inherently, by their chemistry, limit deposition thickness. It is the external control of the valves that limits the reaction, thereby limiting film thickness. The Examiner's conclusion that DiMeco is self-limiting is akin to referring to a conventional light switch as "self-switching" because the switch can be turned on and off by hand.

The skilled artisan would *not* consider the term "self-limiting" in an "ALE process" to encompass a purge-limited deposition process. To the contrary, as evidenced by Applicants' three references which the Examiner has so far refused to consider, the skilled artisan understands that an ALE process is, by definition, self-limiting. Furthermore, the skilled artisan understands that ALE processes are self-limited by virtue of "saturating surface reactions," rather than limited by factors external to the reaction, such as reactive pulse length or purge timing, as taught in DiMeco. In contrast to the evidence provided by Applicants, the Examiner has only offered conclusory statements that a purge limited process teaches a self-limiting process using saturating surface reactions, a conclusion based upon absolutely no evidence showing that the skilled artisan would interpret Applicants' claims in this way. It follows that it is *unreasonable* under *Cortright* for the Examiner to continue to, contrary to the understanding of the skilled artisan, interpret "self-limiting" to be met by the purge-limited process of DiMeco. When Applicants' claims are interpreted using the "broadest *reasonable* interpretation," the cited references still fail to teach or suggest each and every element of Applicants' claims. *Cortright* at 1467. Accordingly, Applicants submit that Claims 1-39 are in condition for allowance and respectfully request the same.

Applicants also maintain the prior arguments detailing the digital CVD nature of DiMeco's process. See, e.g., Response of September 23, 2003, pp. 10-13 and Response of October 29, 2003, pp. 10-13. A single, passing reference to ALE in the background section of DiMeco is insufficient, against the entire remaining disclosure (which only teaches a purge-limited CVD process with no mention of ALE or self-limiting surface reactions), to provide a suggestion to use DiMeco's precursors in an ALE process. Furthermore, the skilled artisan understands that CVD and ALE are fundamentally different and, as a result, would recognize that

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the distinction between the choice of precursors for CVD process and the choice of precursors for ALE is *not trivial*. The self-limiting operation characteristic of ALE depends, in part, on the choice of reactant and will not work with every reactant. For example, the Bedair article provided by Applicants teaches that “[c]autious must be used in the selection of reacting species since they also determine the detailed ALE process.” Bedair, S.M., “Atomic layer epitaxy deposition processes,” Journal of Vacuum Science Technology B, 12 (1), pp. 179-185, 179 (Jan/Feb 1994). The Examiner cannot, without more, just assume that all precursors taught as desirable for CVD are automatically functional in a fundamentally different process, such as ALE. More importantly, the Examiner cannot assume that cyclopentadienyl precursors, in particular, can be used in an ALE process.

Furthermore, even if DiMeo does teach ALE (Applicants maintain that it does not), it is improper for the Examiner to continue to assert that Applicants’ recited cyclopentadienyl precursors are automatically applicable to DiMeo’s process. Instead, the Examiner must still show the desirability of employing those particular CVD precursors in an ALE process. The Examiner has shown neither functionality nor desirability. As a result, the Examiner has not provided the requisite teaching or suggestion to combine DiMeo’s Background ALE passage with the CVD described in the DiMeo’s Detailed Description (i.e., incorporated from Kirilin). Accordingly, Applicants submit that Claims 1-39 are in condition for allowance and respectfully request the same.

### **Factual Errors**

Applicants note that the Examiners’ rejections rest on two factual errors:

1. **First factual error:** “The CVD method [of DiMeo] is described as an *equivalent variant* to the related ALE (atomic layer epitaxy).” Office Action at p. 2 (*emphasis added*). This statement is simply not true. Nowhere does DiMeo state that CVD and ALE are equivalent variants. Instead, DiMeo states that “chemical vapor deposition (CVD) methods and *related* epitaxial deposition methods, such as but not limited to atomic layer epitaxial (ALE) deposition methods, are in turn also *presently of interest*.” DiMeo, Col. 1, ll. 44-50 (*emphasis added*). It is nonsensical to conclude that a process taught as “related” to CVD and “presently of interest” is, therefore, necessarily an equivalent variant. On the contrary,

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the fact that DiMeo clearly makes a distinction between CVD and ALE in the Background section is more properly construed as evidence that they are distinct processes, rather than equivalent variants. For instance, immediately after mentioning ALE and CVD, DiMeo implicates that ALE and CVD are, in fact, variants (not equivalent variants) by referring to “[a]dditional variants upon chemical vapor deposition (CVD) methods and epitaxial deposition methods....” DiMeo, Col. 1, ll. 50-52 (*emphasis added*). It follows from the above that the Examiner’s motivation to combine is based upon factual errors. Even if the Examiner’s characterization were correct, the Examiner would still not have provided a factually sound motivation sufficient to motivate the skilled artisan to employ cyclopentadienyl precursors in an ALE process, as recited in all of Applicants’ claims. Accordingly, Applicants submit that Claims 1-39 are in condition for allowance and respectfully request the same.

2. **Second factual error:** “The examiner notes that the version of claims added 11/17/2003 *does not require saturating surface reactions.*” Office Action at p. 7 (*emphasis added*). This statement is also false. Every independent claim recites “saturating surface reactions” (Claims 1, 27, and 28) or “saturating...surface reactions” (Claim 36). It follows that the Examiner’s rejections are based upon an erroneous reading of Applicants’ claims. As a result of failing to ascertain all the elements of Applicants’ claims, the Examiner has not provided a combination of references teaching each and every element of Applicants’ claims. Accordingly, Applicants submit that Claims 1-39 are in condition for allowance and respectfully request the same.

#### **Confirmation of Both Amendments**

Applicants assume that the Examiner entered *both* the amendments contained in “Amendment and Response to Office Action” (mailed on September 23, 2003) *and* the amendments contained in the “Supplementary Amendment and Response” (mailed on October 29, 2003). However the Examiner has not confirmed this. Accordingly, Applicants respectfully request that the Examiner confirm that both amendments have been entered. Applicants also assume that, unless there was a delay of almost two months in the arrival of the September 23,

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2003 amendment, it is the latter amendment (mailed on October 29, 2003) to which the Examiner refers to as “added 11/17/2003.” Office Action at p. 7.

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**CONCLUSIONS**

In view of the foregoing remarks, Applicants request reconsideration of the rejections and respectfully submit that the claims are in condition for allowance. If, however, some issue remains that the Examiner feels can be addressed by Examiner's Amendment, the Examiner is cordially invited to call the undersigned for authorization.

Please charge any additional fees, including any fees for additional extension of time, or credit overpayment to Deposit Account No. 11-1410.

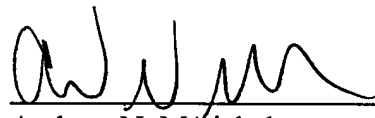
Respectfully submitted,

KNOBBE, MARTENS, OLSON & BEAR, LLP

Dated: \_\_\_\_\_

April 2, 2004

By: \_\_\_\_\_



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